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ADVANCES IN INCINERATION AND RESOURCE RECLAMATION

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Brisbane, California

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Advances in Incineration and Resource Reclamation

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DISCUSSION by J. B. Farrell

This paper describes the important role played by incineration and high temperature processing in the intensive waste water purification process carried out at the municipal sewage treatment plant at South Lake Tahoe. An increasing role for incineration is seen in the future for both conventional treatment and for advanced methods of waste treatment.

When incineration of wastewater sludges is practiced, the organic wastes in the water are converted to combustion products and are discharged into the atmosphere from the incinerator stacks. It is important that one form of pollution is not merely transferred to another form. The authors observe that no smoke or plume is visible at the Tahoe incinerator stacks. Do they have any information about the composition of the stack gases?

Odor is another potential pollutant from the incineration of wastewater sludges. Most of the reports that I have seen indicate no odor nuisance. Nevertheless, the countercurrent nature of contact in Herreschoff-type furnaces, where wet sludge is dried by gaseous combustion products which are relatively cool (e.g. less than 500 F), would seem to favor distillation of volatile odorous substances. The authors might wish to consider the following possibilities:

1. The gaseous products of combustion are enough hotter than the drying solids that the odorous compounds are decomposed.
2. The surface of the solid particles dries rapidly, and burning at the surface starts while the bulk of the particle is still wet. Odorous compounds pass through this flame front and are decomposed.
3. The combustion products have a bad odor, but most of the odor is washed out in the wet scrubbers.

Two minor errors have been noted in the text. The humidity of the cooled combustion gases must be 0.019 lb water per lb BDA, not 0.19 lb per lb. The furnaces are referred to as "6 feet", and I believe it should read "6 hearth".

The paper demonstrates in a clear way the versatility of the Herreschoff-type furnace which performs three different functions in the plant, all in an evidently satisfactory way.

AUTHORS' CLOSURE

As air pollution tests were not a criteria for acceptance of this installation, we do not have complete data on the composition of the stack gases at Tahoe with respect to Hydrocarbons, Carbonyls, SO_2 etc. Such information will be obtained and published in the near future.

Tests on a similar installation in the San Francisco Bay area indicated that all requirements of the Bay Area Air Pollution Code Reg. #2 were met. This installation at the City of San Mateo was accepted by the BAAPCD. Comparison of tests results and the code requirements are as follows:

	Tests	Code Requirement
Hydrocarbons	7.6–7.9 ppm	50 ppm
Carbonyls	18–28 ppm	50 ppm
Particulates	0.016–0.022 grs/cu ft	0.200 grs/cu ft
Sulfur	182 ppm	2000 ppm

The lack of odor from combustion of sewage sludge in a multiple hearth furnace is due primarily to a phenomenon called "Thermal Jump." The upper hearths of a sludge furnace are used primarily for drying and while the exhaust gas temperature is about 800 F the material on these hearths is moist and not above the wet bulb temperature (200 F or less).

When material is partially dried to 50 percent moisture or less in the intermediate hearths it will start to burn and at this level the gaseous products of combustion sweeping upwards in the furnace are at a temperature ranging from 1200–1400 F. At these gas temperatures and with 40–50 percent excess air

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the decomposition products are completely oxidized.

While the incoming sludge may have an odor the large quantities of combustion products have a diluting affect and there is undoubtedly some odor removal in the wet scrubber. Many installations are provided with afterburners, however, we do not know of any such sludge incinerators that actually use the afterburners.

Mr. Farrell's comments on errors in the text are correct as the humidity of the cooled combustion gases should read 0.019 #H_2O/#BDA and the furnace size should read "6 hearth" rather than "6 feet."

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